R. C. ANNAND.

ASSOCIATING MECHANISM FOR WEB PRINTING AND FOLDING MACHINERY.

APPLICATION FILED JUNE 19, 1911.

1,040,256.

Patented Oct. 8, 1912.

3 SHEETS—SHEET 1.

Fig. 1.

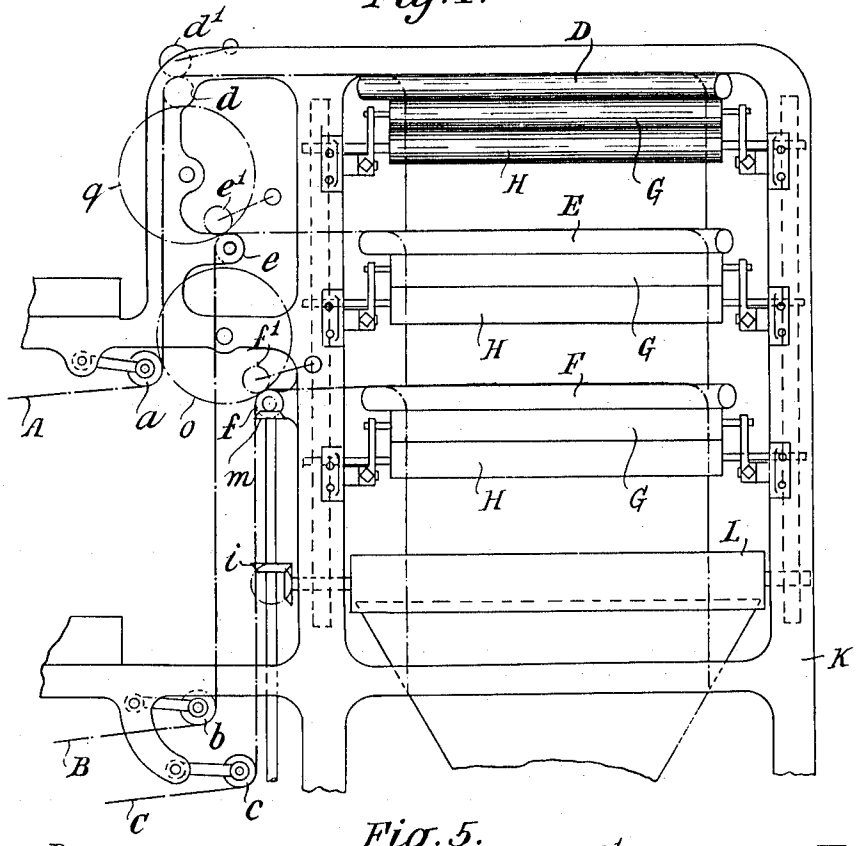

Fig. 5.

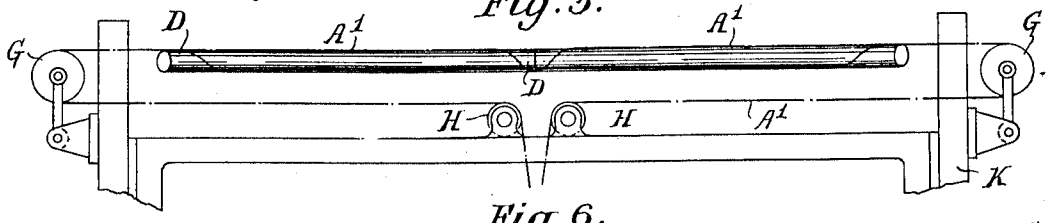

Fig. 6.

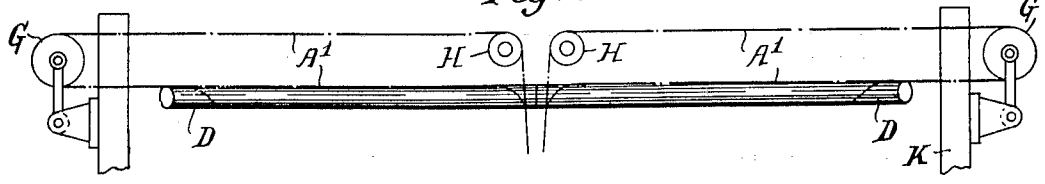

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Fig. 2.

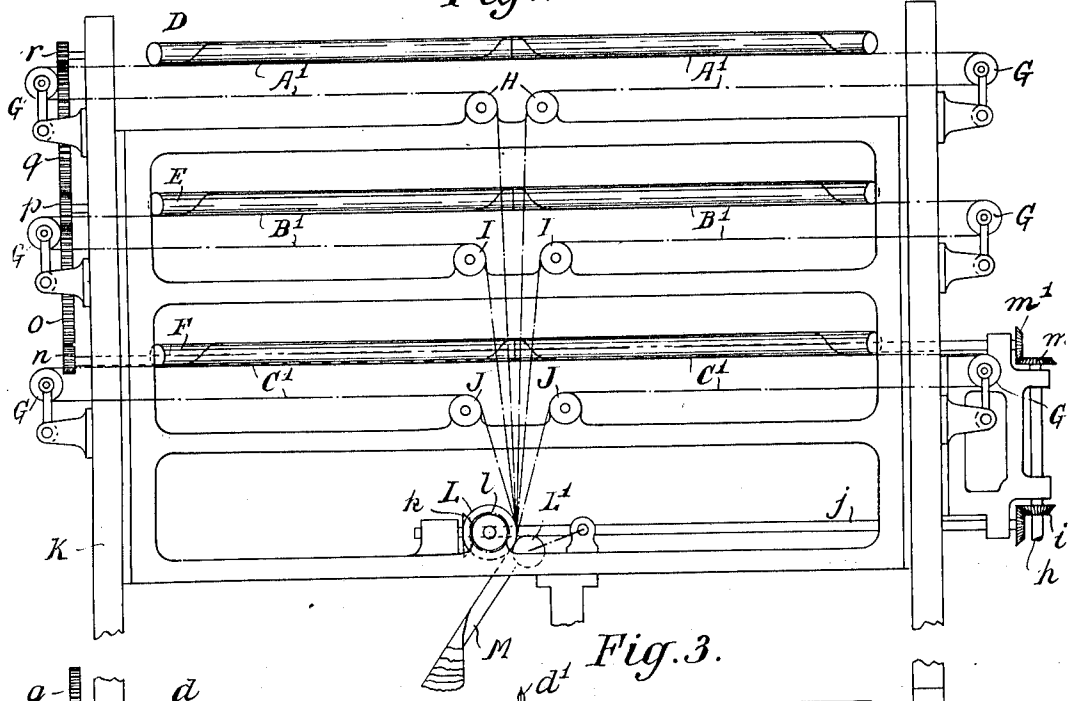
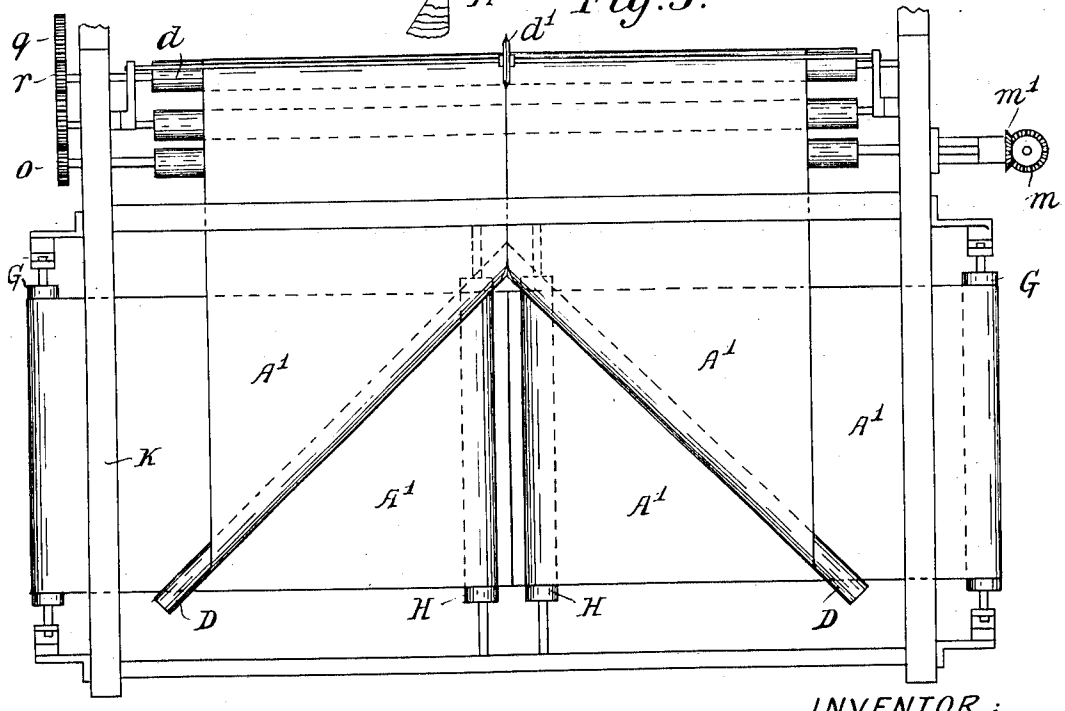


Fig. 3.



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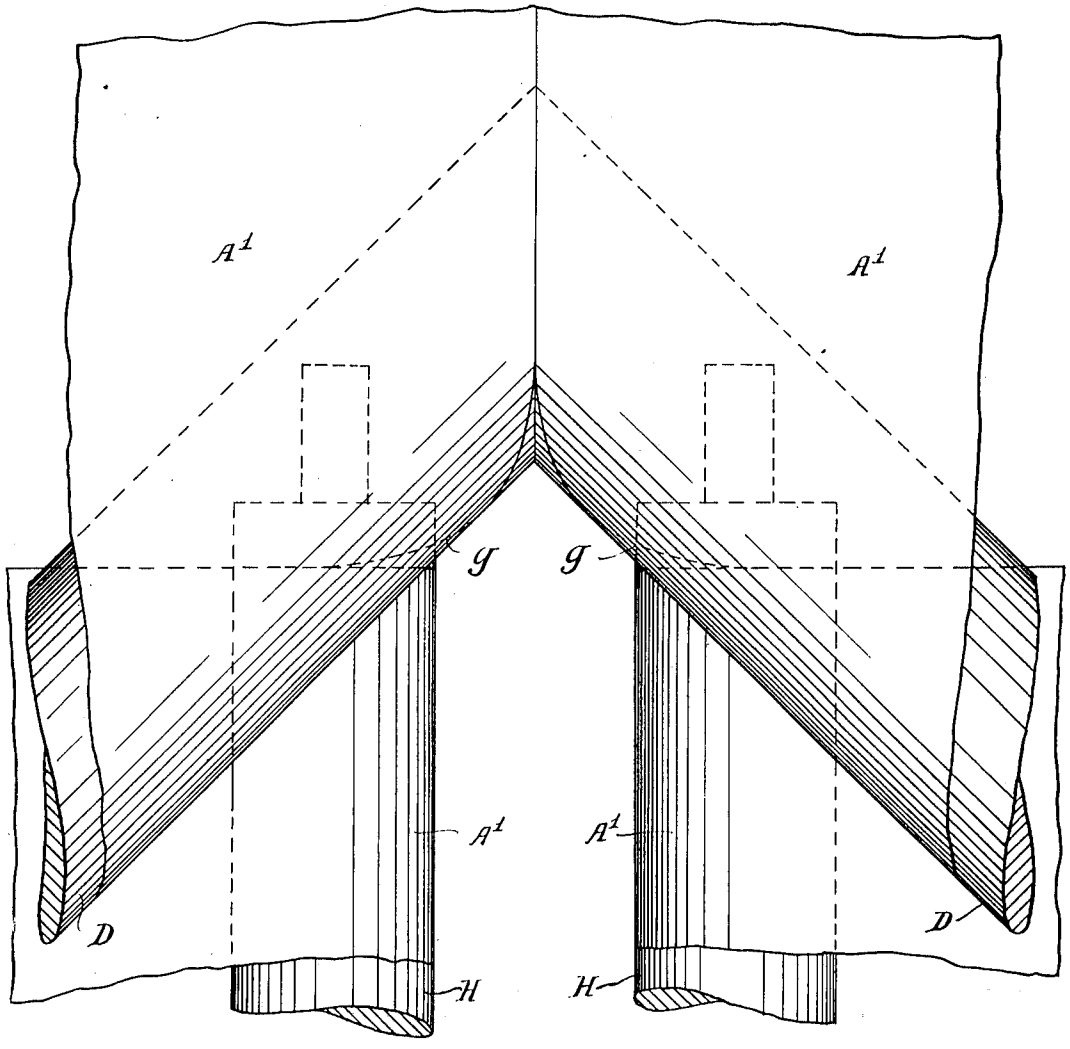
3 SHEETS—SHEET 3.

Fig. 4.



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UNITED STATES PATENT OFFICE.

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ASSOCIATING MECHANISM FOR WEB PRINTING AND FOLDING MACHINERY.

1,040,256. Specification of Letters Patent. Patented Oct. 8, 1912.

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To all whom it may concern:

Be it known that I, ROBERT CUMMING ANNAND, of Barrington street, South Shields, in the county of Durham, England, printer's engineer, have invented certain new and useful Improvements in Associating Mechanism for Web Printing and Folding Machinery, of which the following is a specification.

My invention consists in an improved arrangement of turning or angle bars, by which a large number of printed webs can be associated or superimposed previous to their being folded and made up into the form of newspapers or periodicals of various sizes.

In a multiple web machine, printing webs of what is known as double width, there is difficulty in arranging the turning bars so that the various webs can be associated together when their number is above four, and the devices now in use are complicated and occupy much space and necessitate long travels of the webs.

My arrangement of associating devices occupies less space than mechanism for the same work has hitherto occupied, the length of travel of the webs can be shortened, and, which is of still greater importance, the devices for associating and registering each half web can be of one and the same kind for all the half webs.

I will explain by way of example how my invention can be applied for associating the half webs in a three roll double width machine, and it will be easily understood how the number of webs operated upon can be increased by simply duplicating the mechanism.

Speaking generally, two turning or angle bars are required to associate two half webs. These two turning bars may consist of stationary round bars set parallel to one another and at an angle of 45 degrees to the direction of travel of the webs as they leave the printing press and before they are slit longitudinally. Turning bars can also be arranged at an angle of 90 degrees to each other and placed in the machine so that their apex stands in the direction of the longitudinal line of the printing machine. I will call these double turning bars. I select the latter type of angle bars to form part of my arrangement of novel associating mechanism. I place these double turning bars in horizontal tiers, one set above the other set, preferably with their apices pointing in the direction of the printing press to which they are attached. Each web is carried to its corresponding double turning bars, and just previous to reaching the turning bars, the webs are longitudinally slit in the well-known manner. Dealing with, say, the top web, one half of it is carried to the right around the right hand bar, the other to the left around the left hand bar. The direction of travel of the two half webs has thus been changed to that of right angles to their previous course. The half webs are next carried around registering or guide rollers and are brought back underneath the angle bars, and each is carried around a roller which changes the direction of travel of the webs to that of a vertical descent. By this arrangement the two half webs can descend through between any reasonable number of angle bars arranged in relatively the same horizontal position. The next lower half webs are carried in a manner similar to the first around their corresponding double turning bars, registering or guide rollers and downwardly deflecting rollers and descend in a perpendicular direction outside the two half webs descending from the top tier of turning bars. The half webs on the next lower tier are dealt with in precisely the same manner, and these in turn come outside the four half webs from the upper turning bars. It will be readily understood that more webs can be associated in this manner by repeating the mechanism described.

In superimposing a number of webs of paper, it is usually desirable that the webs shall all be kept apart until they arrive at a part of the machine where they all pass partly around an associating roller, usually a serrated driven roller, against which they are pressed firmly by rubber disks set where the margins come. The pressure of the rubber disks on the webs against the driven serrated roller draws up the slack webs and causes the whole number thus associated to pass in register to any further form of folding mechanism that might be embodied in the machine.

The keeping apart of the webs until they reach a certain point while at the same time passing down between and clear of the lower turning bars, is secured by the present invention, because the edges of the half webs as they are carried to the left and right

around the turning bars are naturally carried partly away from the apex of the bars, and when the webs, after passing the registering or guide rollers, return underneath and pass the rollers which turn them downward into a perpendicular direction, they can pass between the turning bars at a certain distance apart, and, at the same time, clear of the lower turning bars in their descent. For instance, if the angle bars are made four inches in diameter, the half webs can pass through between the angle bars, at a distance of about three inches apart from each other without fouling the lower angle bars.

Instead of the half webs returning under the turning bars to which they appertain, they can return over the same, it being only necessary to arrange the lateral guide rollers and the downwardly directing rollers accordingly.

When I speak of the webs descending vertically or perpendicularly I do not mean that in its exact mathematical sense, as the webs, when kept apart, have to approach each other and in order to do so must depart from a strictly perpendicular path.

By arranging the turning bars in the manner described much space is saved, each half web has the same length of travel, all the half webs are fed through the apparatus in the same way, and the attendants can get to the turning bars with great facility and handiness.

The accompanying drawings illustrate by way of example the application of the invention for folding and associating three double width webs on a printing machine, and represent the folding and associating mechanism diagrammatically.

Figure 1 is a side elevation of the folding and associating mechanism; Fig. 2 is an end elevation thereof, and Fig. 3 is a plan. Fig. 4 is a detail plan view on a larger scale, and illustrates how trend of the webs away from the apex of the angle bars in turning enables them to return and be directed downward between the angle bars below without fouling the same. Fig. 5 is a part end view showing a slight modification in which the half webs are led in under the angle bars instead of over them. Fig. 6 is a similar view showing a modification indicating that the half webs can be returned above the turning bars to which they appertain, instead of under the same.

A, B and C represent the three printed webs of paper as they pass to the folding and associating mechanism. These webs pass in the usual way around registering rollers *a*, *b*, *c* to the customary slitting mechanisms consisting of driven grooved rollers *d*, *e*, *f* coacting respectively with rotary driven cutters *d'*, *e'*, *f'* which slit the webs just before they pass on to the turning bars D D, E E, F F. The gearing for communicating the drive to the cutters *d'*, *e'*, *f'* is omitted, it being of the usual kind. The turning bars D D, E E, F F are arranged in pairs united at right angles, with their apices in the longitudinal direction of the corresponding web, and the pairs of turning bars are superimposed.

The halves A' A', B' B', C' C' of the slit webs pass respectively to right and left around the bars D D, E E, F F, which divert them into a direction at right angles to their original line of travel. In Figs. 1 to 3 the half webs are shown as led over and around the turning bars, whereas in Fig. 5 they are led under and around them. From the turning bars the half webs are led around registering rollers G G mounted on the framing K at the sides of the machine and serving to direct the half webs A' B' C' back toward the longitudinal mid-plane of the double turning bars, and the half webs are then carried respectively around pairs of rollers H H, I I, J J, which divert the half webs downward, A' A' passing between the turning bars E E and F F, and B' B' between the turning bars F F, and the six half webs passing to the associating roller L. It will be seen that the top half webs A' A' pass down between the half webs B' B' next below, and these pass down between the next lower pair of half webs C' C', and so on for the desired number of webs. The rollers H H, I I, J J, of each pair should be at a sufficient distance apart from each other for the webs to be kept apart until they reach the associating mechanism, and on the other hand they should not be so far apart that the webs in their descent will foul the turning bars below. By way of example, if the turning bars are four inches in diameter, the rollers H H may be about three inches apart, and the rollers I I and J J of the pairs below may be at the same distance or (as shown) at a somewhat greater distance apart.

From the mechanism described the six webs pass to an associating device of the usual kind, consisting of a serrated driven roller L against which the webs are pressed by rubber disks L' set where the margins come. The slack webs are thus drawn up and associated so that they pass on in register to any further mechanism that the machine may comprise. In Fig. 2 the six webs are shown passing on to the taper fold former M of an ordinary folding mechanism.

Reference to Fig. 4 will show more clearly how the natural trend of the edges *g* of the half webs away from the apex of the turning bars enables them when returned inward and directed downward by the rollers, to pass down clear of the turning bars below. It will be seen that this lateral

and rearward divergence of the edges *g* enables the circumference of the downwardly directing rollers (H H, Fig. 4) to extend sufficiently far inward that the edge *g* on returning and passing downward around this roller, will descend clear of the turning bar below, while at the same time the webs can be kept apart in their descent.

The drive is imparted to the slitting mechanisms and associating mechanism in any usual way. In the drawings this is shown as effected by a vertical shaft *h* driven from any suitable part of the machine. A bevel wheel *i* on this shaft drives a shaft *j* which through bevel gears *k l* drives the associating roller L. The motion is imparted to the slitting rollers *d e f* from another bevel wheel *m* on the vertical shaft *h*. The bevel wheel *m* gears with a bevel wheel *m'* on the shaft of the slitting roller *f*, and the motion is transmitted from *f* to the slitting rollers *e d* by toothed gearing *n o p q r* of which the wheels *n p* and *r* are mounted on the respective slitting rollers.

In Fig. 5 the half webs are led in under the turning bars instead of over them, the only difference in construction being that correspondingly larger registering rollers are required.

In Fig. 6 the half webs after passing around the turning bars return inward above the turning bars to which they appertain, the registering rollers G being suitably located for this purpose and the downwardly directing rollers H being located above their corresponding turning bars.

What I claim as my invention, and desire to secure by Letters Patent, is:—

1. Associating mechanism for web printing and folding machinery, comprising in combination a plurality of vertically superposed pairs of turning bars at right angles, adapted to turn the webs of the corresponding pairs laterally to right and left, means for returning the laterally diverted webs inwardly toward vertical longitudinal midplane of the turning bars, and means for deflecting the inwardly returned webs downward through the space comprised between the turning bars below, said turning bars having rounded turning faces and being thereby adapted to throw the turned half-webs of paper off from the point of separation of the split web so as to provide a clearance for the downwardly led half-webs.

2. Associating mechanism for web printing and folding machinery, comprising in combination a plurality of vertically superposed pairs of turning bars at right angles, adapted to turn the webs of the corresponding pairs laterally to right and left, means for returning the laterally diverted webs inwardly toward vertical longitudinal midplane of the turning bars, and means for deflecting the inwardly returned webs of each pair downward within the turning bars that are below and inside the downwardly diverted webs of the pair next below, said turning bars having rounded turning faces and being thereby adapted to throw the turned half-webs of paper off from the point of separation of the split web so as to provide a clearance for the downwardly led half-webs.

3. Associating mechanism for web printing and folding machinery, comprising in combination a plurality of vertically superposed pairs of turning bars at right angles, adapted to turn the webs of the corresponding pairs laterally to right and left, means for returning the laterally diverted webs inwardly toward the vertical longitudinal mid-plane of the turning bars and devices for deflecting the inwardly returned webs of each pair downward inside the downwardly deflected pair next below and in planes located within the limit of the space inclosed by the pair of turning bars that are next below, said turning bars having rounded turning faces and being thereby adapted to throw the turned half-webs of paper off from the point of separation of the split web so as to provide a clearance for the downwardly led half-webs, said deflecting devices being located so that the various webs are apart from each other in their descent, substantially as described.

4. Associating mechanism for web printing and folding machinery, comprising in combination a plurality of vertically superposed pairs of turning bars at right angles, adapted to turn the webs of the corresponding pairs laterally to right and left, means for returning the laterally diverted webs inwardly toward the vertical longitudinal mid-plane of the turning bars, and devices for deflecting the inwardly returned webs of each pair downward inside the downwardly deflected pair next below and in planes located within the limits of the space inclosed by the pair of turning bars that are next below, said turning bars having rounded turning faces and being thereby adapted to throw the turned half-webs of paper off from the point of separation of the split web so as to provide a clearance for the downwardly led half-webs, and an associating roller and pressure disks for completing the association in register of the pairs of webs.

5. Associating mechanism for web printing and folding machinery, comprising in combination a plurality of vertically superposed pairs of turning bars at right angles, adapted to turn the webs of the corresponding pairs laterally to right and left, means for returning the laterally diverted webs inwardly toward the vertical longitudinal mid-plane of the turning bars, and devices for deflecting the inwardly returned webs

of each pair downward clear of each other inside and clear of the downwardly deflected pair next below and in planes located within the limits of the space inclosed by the pair of turning bars that are next below, said turning-bars having rounded turning faces and being thereby adapted to throw the turned half-webs of paper off from the point of separation of the split web so as to provide a clearance for the downwardly led half-webs, said deflecting devices being so located that the various webs are apart from each other in their descent, substantially as described.

6. Associating mechanism for web printing and folding machinery, comprising in combination a plurality of vertically superposed pairs of turning bars at right angles, adapted to turn the webs of the corresponding pairs laterally to left and right, guide rollers located to return the laterally diverted webs inwardly toward the vertical longitudinal mid-plane of the turning bars, and guide rollers located to deflect the inwardly returned webs of each pair downward inside the turning bars and downwardly deflecting guide rollers that are below, said turning-bars having rounded turning faces and being thereby adapted to throw the turned half-webs of paper off from the point of separation of the split web so as to provide a clearance for the downwardly led half webs, substantially as and for the purpose described.

7. Associating mechanism for web printing and folding machinery, comprising in combination a plurality of vertically superposed pairs of turning bars at right angles, adapted to turn the webs of the corresponding pairs laterally to left and right, guide rollers located to return the laterally diverted webs inwardly toward the vertical longitudinal mid-plane of the turning bars, and guide rollers located to deflect the inwardly returned webs of each pair downward in planes located within the limits of the space inclosed by the turning bars that are below, said turning-bars having rounded turning faces and being thereby adapted to throw the turned half-webs of paper off from the point of separation of the split web so as to provide a clearance for the downwardly led half webs, substantially as and for the purpose described.

8. Associating mechanism for web printing and folding machinery, comprising in combination a plurality of vertically superposed pairs of turning bars at right angles, adapted to turn the webs of the corresponding pairs laterally to left and right, guide rollers located to return the laterally diverted webs inwardly toward the vertical longitudinal mid-plane of the turning bars, and guide rollers located to deflect the inwardly returned webs of each pair downward, in planes located within the limits of the space inclosed by the turning bars that are below, and within the space existing between the downwardly deflecting guide rollers that are below, said turning-bars having rounded turning faces and being thereby adapted to throw the turned half-webs of paper off from the point of separation of the split web so as to provide a clearance for the downwardly led half webs, substantially as and for the purposes described.

9. Associating mechanism for web printing and folding machinery, comprising in combination a plurality of vertically superposed pairs of turning bars at right angles, adapted to turn the webs of the corresponding pairs laterally to left and right, guide rollers located to return the laterally diverted webs inwardly toward the vertical longitudinal mid-plane of the turning bars, and guide rollers located to deflect the inwardly returned webs of each pair downward inside the turning bars and downwardly deflecting guide rollers that are below, said turning-bars having rounded turning faces and being thereby adapted to throw the turned half-webs of paper off from the point of separation of the split web so as to provide a clearance for the downwardly led half webs, and an associating roller and pressure disks for completing the association of the descending webs and mounted below the superposed series of turning bars and downwardly deflecting rollers, substantially as described.

10. Associating mechanism for web printing and folding machinery, comprising in combination a plurality of vertically superposed pairs of turning bars at right angles, adapted to turn the webs of the corresponding pairs laterally to left and right, guide rollers located to return the laterally diverted webs inwardly under their appertaining turning bars toward the vertical longitudinal mid-plane of the turning bars, and guide rollers located to deflect the inwardly returned webs of each pair downward inside the turning bars and downwardly deflecting guide rollers that are below, said turning-bars having rounded turning faces and being thereby adapted to throw the turned half-webs of paper off from the point of separation of the split web so as to provide a clearance for the downwardly led half-webs, substantially as and for the purpose described.

11. Associating mechanism for web printing and folding machinery, comprising in combination a plurality of vertically superposed pairs of turning bars at right angles, adapted to turn the webs of the corresponding pairs laterally to left and right, lateral registering rollers located to return the laterally diverted webs inwardly toward the

vertical longitudinal mid-plane of the turning bars, and guide rollers located to deflect the inwardly returned webs of each pair downward inside the turning bars and downwardly deflecting guide rollers that are below, said turning-bars having rounded turning faces and being thereby adapted to throw the turned half-webs of paper off from the point of separation of the split web so as to provide a clearance for the downwardly led half webs, substantially as and for the purpose described.

12. In associating mechanism for web printing and folding machinery, a plurality of superposed elements each comprising a pair of turning bars at right angles adapted to turn a pair of half webs laterally to right and left, and disposed with its apex longitudinally toward the webs to be associated, lateral rollers located to return the laterally diverted half webs inward, and guide rollers parallel to said lateral rollers and to each other and located toward the vertical longitudinal mid-plane of the turning bars on either side thereof, said turning-bars having rounded turning faces and being thereby adapted to throw the turned half-webs of paper off from the point of separation of the split web so as to provide a clearance for the downwardly led half-webs, substantially as described.

13. Associating mechanism for web printing and folding machinery comprising in combination a plurality of superposed turning bars arranged at an angle, adapted to turn halves of a split web to one side and the other, and means for leading the web-halves from superposed turning-bars downwardly between those turning-bars which are beneath, the turning faces of said turning-bars, being rounded and thereby adapted to throw the turned half webs of paper off from the point of separation of the split web so as to provide a clearance for the downwardly-led half webs.

In witness whereof, I have hereunto signed my name in the presence of two subscribing witnesses.

ROBERT CUMMING ANNAND.

Witnesses:

ROBERT BERTRAN TURNER,

ERNEST ANDERSON.